

§111.17. Mathematics, Grade 5.

- (a) Introduction.
- (1) Within a well-balanced mathematics curriculum, the primary focal points at Grade 5 are comparing and contrasting lengths, areas, and volumes of two- or three-dimensional geometric figures; representing and interpreting data in graphs, charts, and tables; and applying whole number operations in a variety of contexts.
  - (2) Throughout mathematics in Grades 3-5, students build a foundation of basic understandings in number, operation, and quantitative reasoning; patterns, relationships, and algebraic thinking; geometry and spatial reasoning; measurement; and probability and statistics. Students use algorithms for addition, subtraction, multiplication, and division as generalizations connected to concrete experiences; and they concretely develop basic concepts of fractions and decimals. Students use appropriate language and organizational structures such as tables and charts to represent and communicate relationships, make predictions, and solve problems. Students select and use formal language to describe their reasoning as they identify, compare, and classify two- or three-dimensional geometric figures; and they use numbers, standard units, and measurement tools to describe and compare objects, make estimates, and solve application problems. Students organize data, choose an appropriate method to display the data, and interpret the data to make decisions and predictions and solve problems.
  - (3) Throughout mathematics in Grades 3-5, students develop numerical fluency with conceptual understanding and computational accuracy. Students in Grades 3-5 use knowledge of the base-ten place value system to compose and decompose numbers in order to solve problems requiring precision, estimation, and reasonableness. By the end of Grade 5, students know basic addition, subtraction, multiplication, and division facts and are using them to work flexibly, efficiently, and accurately with numbers during addition, subtraction, multiplication, and division computation.
  - (4) Problem solving, language and communication, connections within and outside mathematics, and formal and informal reasoning underlie all content areas in mathematics. Throughout mathematics in Grades 3-5, students use these processes together with technology and other mathematical tools such as manipulative materials to develop conceptual understanding and solve meaningful problems as they do mathematics.

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(b) Knowledge and skills.

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| <p>(5.1) <b>Number, operation, and quantitative reasoning.</b> The student uses place value to represent whole numbers and decimals.</p> | <p>The student is expected to:</p> <ol style="list-style-type: none"> <li>(A) use place value to read, write, compare, and order whole numbers through the 999,999,999,999; and</li> <li>(B) use place value to read, write, compare, and order decimals through the thousandths place.</li> </ol>  |
| <p>(5.2) <b>Number, operation, and quantitative reasoning.</b> The student uses fractions in problem-solving situations.</p>             | <p>The student is expected to:</p> <ol style="list-style-type: none"> <li>(A) generate a fraction equivalent to a given fraction such as <math>\frac{1}{2}</math> and <math>\frac{3}{6}</math> or <math>\frac{4}{12}</math> and <math>\frac{1}{3}</math>;</li> <li>(B) generate a mixed number equivalent to a given improper fraction or generate an improper fraction equivalent to a given mixed number;</li> <li>(C) compare two fractional quantities in problem-solving situations using a variety of methods, including common denominators; and</li> <li>(D) use models to relate decimals to fractions that name tenths, hundredths, and thousandths.</li> </ol> |

<p>(5.3) <b>Number, operation, and quantitative reasoning.</b> The student adds, subtracts, multiplies, and divides to solve meaningful problems.</p>	<p>The student is expected to:</p> <ul style="list-style-type: none"> <li>(A) use addition and subtraction to solve problems involving whole numbers and decimals;</li> <li>(B) use multiplication to solve problems involving whole numbers (no more than three digits times two digits without technology);</li> <li>(C) use division to solve problems involving whole numbers (no more than two-digit divisors and three-digit dividends without technology), including interpreting the remainder within a given context;</li> <li>(D) identify common factors of a set of whole numbers; and</li> <li>(E) model situations using addition and/or subtraction involving fractions with like denominators using concrete objects, pictures, words, and numbers.</li> </ul>
<p>(5.4) <b>Number, operation, and quantitative reasoning.</b> The student estimates to determine reasonable results.</p>	<p>The student is expected to use strategies, including rounding and compatible numbers to estimate solutions to addition, subtraction, multiplication, and division problems.</p>
<p>(5.5) <b>Patterns, relationships, and algebraic thinking.</b> The student makes generalizations based on observed patterns and relationships.</p>	<p>The student is expected to:</p> <ul style="list-style-type: none"> <li>(A) describe the relationship between sets of data in graphic organizers such as lists, tables, charts, and diagrams; and</li> <li>(B) identify prime and composite numbers using concrete objects, pictorial models, and patterns in factor pairs.</li> </ul>
<p>(5.6) <b>Patterns, relationships, and algebraic thinking.</b> The student describes relationships mathematically.</p>	<p>The student is expected to select from and use diagrams and equations such as <math>y = 5 + 3</math> to represent meaningful problem situations.</p>
<p>(5.7) <b>Geometry and spatial reasoning.</b> The student generates geometric definitions using critical attributes.</p>	<p>The student is expected to identify essential attributes including parallel, perpendicular, and congruent parts of two- and three-dimensional geometric figures.</p>
<p>(5.8) <b>Geometry and spatial reasoning.</b> The student models transformations.</p>	<p>The student is expected to:</p> <ul style="list-style-type: none"> <li>(A) sketch the results of translations, rotations, and reflections on a Quadrant I coordinate grid; and</li> <li>(B) identify the transformation that generates one figure from the other when given two congruent figures on a Quadrant I coordinate grid.</li> </ul>

(5.9) **Geometry and spatial reasoning.** The student recognizes the connection between ordered pairs of numbers and locations of points on a plane.

The student is expected to locate and name points on a coordinate grid using ordered pairs of whole numbers.

(5.10) **Measurement.** The student applies measurement concepts involving length (including perimeter), area, capacity/volume, and weight/mass to solve problems.

The student is expected to:

- (A) perform simple conversions within the same measurement system (SI (metric) or customary);
- (B) connect models for perimeter, area, and volume with their respective formulas; and
- (C) select and use appropriate units and formulas to measure length, perimeter, area, and volume.

(5.11) **Measurement.** The student applies measurement concepts. The student measures time and temperature (in degrees Fahrenheit and Celsius).

The student is expected to:

- (A) solve problems involving changes in temperature; and
- (B) solve problems involving elapsed time.

(5.12) **Probability and statistics.** The student describes and predicts the results of a probability experiment.

The student is expected to:

- (A) use fractions to describe the results of an experiment;
- (B) use experimental results to make predictions; and
- (C) list all possible outcomes of a probability experiment such as tossing a coin.

(5.13) **Probability and statistics.** The student solves problems by collecting, organizing, displaying, and interpreting sets of data.

The student is expected to:

- (A) use tables of related number pairs to make line graphs;
- (B) describe characteristics of data presented in tables and graphs including median, mode, and range; and
- (C) graph a given set of data using an appropriate graphical representation such as a picture or line graph.

(5.14) **Underlying processes and mathematical tools.** The student applies Grade 5 mathematics to solve problems connected to everyday experiences and activities in and outside of school.

The student is expected to:

- (A) identify the mathematics in everyday situations;
- (B) solve problems that incorporate understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness;
- (C) select or develop an appropriate problem-solving plan or strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem; and
- (D) use tools such as real objects, manipulatives, and technology to solve problems.

(5.15) **Underlying processes and mathematical tools.** The student communicates about Grade 5 mathematics using informal language.

The student is expected to:

- (A) explain and record observations using objects, words, pictures, numbers, and technology; and
- (B) relate informal language to mathematical language and symbols.

(5.16) **Underlying processes and mathematical tools.** The student uses logical reasoning.

The student is expected to:

- (A) make generalizations from patterns or sets of examples and nonexamples; and
- (B) justify why an answer is reasonable and explain the solution process.